APPENDIX G

Chapter 1
Overview

Welcome to the world of RealAudio, the premier Internet audio delivery system. By setting up a RealAudio Server and providing audio libraries, you can be an active participant in the exciting new world of real-time audio on the World Wide Web.

RealAudio technology provides real-time audio-on-demand and comprises components: the RealAudio Player and the RealAudio Server. In addition, encoding tools are provided to enable the generation of RealAudio content from raw audio input.

- The RealAudio Player lets you listen to audio files that have been created on the RealAudio Server. The Player plays RealAudio files in real time over a TCP/IP network. It is available for download at no charge from Progressive Networks' Website at http://www.realaudio.com/. RealAudio Players are available for Microsoft Windows, Apple Macintosh and Unix operating systems.

- The RealAudio Server is sophisticated software which runs on a Windows, Macintosh and UNIX platforms. It enables audio streams to be passed from the Internet to RealAudio Players. The Server operates similarly to Internet servers.

- The RealAudio Encoder enable users and Server operators to encode PC and UNIX audio files into the RealAudio format. RealAudio files consisting compressed audio data can be streamed by the Server in real time over low bandwidth connections, such as 14.4 kbaud modem connections.

This documentation provides instructions for the installation, operation and management of your RealAudio Server, as well as information about the RealAudio files. It assumes that you have a basic knowledge of the Internet and basic Web server operation.

RealAudio Method of Operation

RealAudio Player users typically gain access to audio content via the World Wide Web. References to RealAudio files are embedded in HTML documents provided by a Web server. The method of interaction between the RealAudio Server and the Web browser is shown in Figure 1-1.
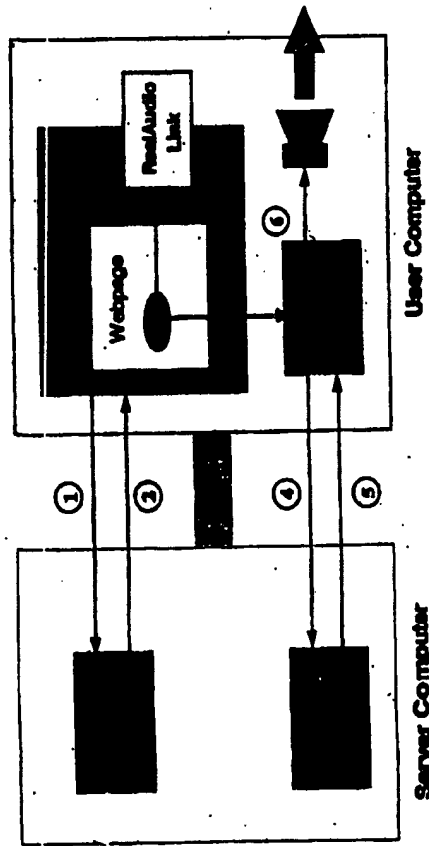

Server Computer   **User Computer**

Figure 1-1. Information delivery pathway employed by the Web browser when activating RealAudio files.

When the user clicks on a RealAudio link (1),[1] the HTML document on the Web page accesses a metafile. The metafile is a document that contains the Universal Resource Locator (URL) of the audio file on your RealAudio Server.[2] The URL is sent by the Web server to the user's browser (2), and then to the RealAudio Player

[1] Provided the RealAudio Player is installed on the user's computer and the RealAudio MIME type is recognized by the Web browser.

[2] Metafiles are stored in files with the same extension, the RealAudio data itself is stored in files with the .ra extension.

---

(3). The RealAudio Player requests the audio file from the RealAudio Server which delivers the audio stream to the Player (5), where it is played (6).

There is virtually no time delay between the user clicking and the audio and playing. The RealAudio Server opens the requested audio file and sends via the User Datagram Protocol (UDP) packets to the user's computer where it is uncompressed and played through the local sound system. The RealAudio Player maintains communication with the RealAudio Server, allowing the user to control the audio stream in a manner similar to a cd player.

The RealAudio system has been specially designed to permit continuous playback, even over dialup connections.

Streams

The RealAudio Server and the accompanying encoding tools enable you to create and deliver RealAudio content. The number of simultaneous users who can connect and from your server at any given time is referred to as the "number of streams." The number of streams a server can deliver depends upon the type of RealAudio Server you have licensed, the power of your server machine and the bandwidth between your server and the Internet (each audio stream requires 10kbits per second of network bandwidth).

RealAudio Server Features

Key features of the RealAudio Server:

* support for full random access on a per-stream basis

* support for many simultaneous streams

* generation of log files, thus allowing system administrators to gather usage and generate billing and usage information

* tools for creating RealAudio content files on your server platform

This documentation provides instructions for the installation, operation and management of your RealAudio Server, as well as information about encoding RealAudio files. It assumes that you have a basic knowledge of the Internet and how Web servers operate.

Operating Systems Supported

At present, the Server is available for the following Architectures and Operating Systems

Intel 486, Pentium

- Microsoft Windows NT 3.5
- BSDI 2.0
- LINUX 1.x

Sun SPARC

- SunOS 4.1x
- Solaris 2.x

Silicon Graphics

- IRIX version 5.2

Bandwidth Requirements

The RealAudio Player only requires approximately 10K baud[1], used easily on a 14.4K baud modem. The RealAudio Server requires at least this bandwidth at Internet backbone for each client connected. Therefore, a 56k baud bound line only accommodate approximately four simultaneous connections. A T1 line, b contrast, can accommodate over 100 simultaneous connections, and is recommended for RealAudio Server applications. Keep in mind that the bandwidth consumed by other applications (e.g., the Web server) should be taken into account while estimating the number of simultaneous users that can be accommodated. 100-stream Server is configured to allow a T1 line to be used for both RealAudio and moderate Web data traffic.

Web Server Compatibility

Except in specialized applications, users access RealAudio files via links embedded in World Wide Web pages, as described above. Therefore, you will need RealAudio used to have a Web server installed and configured to recognize the RealAudio MIME type. The details of this configuration are discussed in the next chapter is also important to appreciate that, although a Web server is needed to make b use of RealAudio, it does not need to be located on the same machine as your RealAudio Server. Although in smaller configurations they can be located on t same machine, typically they are not.

Memory and CPU Requirements

The RealAudio Server has a relatively small memory footprint. A 100-stream NT Server, for example, has a memory footprint of approximately 2Mb. A system connected by a T1 line is likely to run out of bandwidth before it runs out of memory. Keep in mind that disk caching schemes that system attempts are not performed by other applications.

The Server is modest in its CPU impact. A 100-stream server operating on a 90MHz Pentium consumes less than 30% of the CPU.

Disk Space Requirements

The software requires approximately 4Mb of disk space. Compressed audio documents will require approximately 1KB (1024 bytes) per second of audio, yielding 3.6Mb of disk requirement per hour of audio.

[1] 1 baud = 1 kilobit per second, not to be confused with Kb/s = kilobyte per second which is 8X as much (8 bits byte + start + stop bits)

The RealAudio Server has been tested with the following Web servers:

- Netscape Netsite

- BIWAC HTTPS 0.96

- NCSA HTTPD (v1.3 or v1.4)

- CERN HTTPD (v 3.0)

- O'Reilly Website NT

In general, the RealAudio Server can be configured to work with any Web server which supports configurable MIME types. Please e-mail Progressive Networks, at server2@prognet.com or consult our Web page for more information.

Conventions

This manual uses the following conventions:

Courier or font	Represents commands typed in or information displayed on the screen.
<filename>	Used to show where to insert information. For example, the name and location of a file, or configuration parameter.
Bold	For names of files and folders provided in the Progressive Networks server distribution.
Italic	To reference other sections in this manual.

Terminology

For the purposes of this manual, the following terms are used as defined.

client	A client is the application from the user's machine that connects to a Web site. In this manual, it will always refer to the RealAudio Player, which is the only proper interface for playing RealAudio files from the RealAudio Server.

metafiles	Metafiles are text files that refer the RealAudio Player the RealAudio file. The only information contained in the metafile is the URL location of the .ra file they refer to. They are described in Chapter 3, in the section Creating Metafiles (files with a .ram extension).
RealAudio files	RealAudio files are audio files that have been encoded into the RealAudio format.
.ram files	Metafiles have the .ram extension, and are sometimes referred to as .ram files.
.ra files	RealAudio files have the .ra extension.

Chapter 2

Installing and Administering the RealAudio Server

This chapter discusses the installation, testing, and administration of the Rea Server. The topics covered include:

Installation

- Copying or downloading the RealAudio distribution archive file

- Expanding the archive and installing the files in the appropriate directories on your server system

- Editing the RealAudio and system configuration files on your serv allow the RealAudio Server to startup and run properly on your sy

- Editing the configuration of your Web server to support the RealA MIME types

- Testing your RealAudio Server

Administration

- Starting, stopping, and administering the Server

- Using the Monitor Application to track Server operation

Instructions are provided for both UNIX and Windows NT. To assist you d the setup process, a pull-out checklist is provided in Appendix B.

stalling the RealAudio Server

Before you can download and install the RealAudio Server, you must have authorization from Progressive Networks. As an authorized customer, you will be sent a URL for use in downloading the software.

The URL provided to you is your password to gain access to the server archive.

When you connect to the URL using a Web browser, you will be presented with an online copy of the Progressive Networks Server License Agreement. You must accept the terms of this agreement online before you can proceed to download the Server.

Once you have accepted the license you will be prompted to download the Server. Use your Web browser to download the server distribution to your local machine. The version of the RealAudio Server that will download has been customized to your needs.

After you have obtained the server distribution, create a directory for it. We suggest the directory be named "pnserver." If you downloaded the Server to a different machine than the one on which you will run it, you must move the distribution file to the correct machine before you uncompress it. Use a utility such as zip for this purpose. On Windows NT, the distribution is in the form of a ZIP file. On UNIX it is in the form of a compressed tar file.

Before installing the server distribution, it is also important to ensure that you are logged in as a user with the correct privileges.

To extract the server distribution from the compressed distribution file, proceed as follows:

On Windows NT:

You should be logged on as a user with administrative privileges. This will allow you to successfully install the Server as a System Service.

Copy the ZIP file to your pnserver directory and execute the following command:

```
pkunzip /d pnserver.zip
```

Note that the /d option to pkunzip is important!

On UNIX:

You should be logged on as the super-user. Although the RealAudio Server operate without root privileges, it may not operate to its full potential because certain system calls made by the Server to allocate system resources can only be made by the super-user (see *Starting the Server Manually* here in this chapter).

Copy the compressed tar file to your pnserver directory and execute the following command:

```
uncompress pnserver.tar.Z   tar -xf pnserver.tar
```

Contents of the Server Archive

Once unzipped, the files will reside in the following subdirectories:

```
doc
bin
log
rafiles
```

The rafiles directory tree is the root directory for your RealAudio files.

Once the Server has been installed, set up the configuration files using the instructions in the next section.

A quick reference for configuration parameters is available in Appendix A.

Configuring the Server

The RealAudio Server's operational characteristics are controlled by a configuration file. The configuration file provides information to the Server at the setup of your RealAudio system such as the location of RealAudio files and number of simultaneous streams to offer on the network. The configuration f ...

---

also need to indicate the location of the server log files, which record accesses made to your server and any error messages.

A default example of a configuration file is provided with the distribution in the file pnserver.conf. You can edit this file using your preferred text editor.

The configuration consists of a number of tokens, separated by white space. For example:

```
# TCP/TP port for RealAudio Server Connections
PnaPort    7070
```

Any line beginning with a # character is treated as a comment.

Configurable parameters for the RealAudio Server are described below.

PNA Protocol Port

All Internet service receive calls from clients by listening at a particular port number. The RealAudio Server normally operates on TCP port 7070. In order to specify a different port number, enter the following line into your pnserver.conf file.

```
PnaPort    <portNumber>
```

The <portNumber> should not exceed 32767. The only reason to use a port other than the default is to allow several servers to coexist on one system, or to maintain some privacy when serving information by using an unusual port number.

Maximum Audio Connections

The maximum number of simultaneous audio connections your server can support is determined by the license you have purchased. This entry allows you to set a limit less than or equal to this number. To specify a lower value, enter the following line in the pnserver.conf file.

```
AudioConnections    <AudioConnections>
```

The maximum number of connections cannot usefully exceed the maximum number that the bandwidth of your Internet connection will support. A 56k frame relay or ISDN connection will support approximately 10 connections, while the T1 line will support approximately 100.

Connection Timeout

Since every connection consumes valuable resources, users should not be permit to "go idle" for long periods of time. Playing audio does not constitute going idle of course. The user is idle only if the connection is used to pause audio, or the Player has reached the end of the audio program without disconnecting.

By default, the Server will "hang up" on a connection after five minutes of idle time. To set a different value, you must add the following line to pnserver.conf

```
Timeout    <seconds>
```

The client will automatically reconnect after being timed out by the Server if the user hits the play button.

Maximum Monitor Connections

The Monitor is a Windows application used to track the operation of a running RealAudio Server. Its use is described later in this chapter. The Monitor connect to the Server over a TCP/IP connection and the maximum number of these connections should be restricted to the number of consoles from which you anticipate the monitor software will be run.

The maximum number of monitor connections defaults to 2, and is independent the number of audio connections. To specify a different value, enter the following line in pnserver.conf file.

```
MonitorConnections    <MaximumMonitorConnections>
```

Monitor Password

To ensure that unauthorized users cannot monitor your server, you must insert t following into your password.

```
MonitorPassword    <passwordOfYourChoice>
```

You can share this password for diagnostic purposes.

Base Path

All RealAudio documents delivered by your server will reside in, or beneath, the directory specified by the base path. Enter the full pathname of this directory using the following format into the pnserver.conf file.

BasePath   <basepath>

It is suggested that this path point to the radfiles subdirectory of your server installation directory, as this directory contains several sample documents.

Log Path

The RealAudio Server will log information registering every access to your server into the file specified by the log path. Enter a line using the following format into the pnserver.conf file:

LogPath   <logpath>

It is suggested that this path point to the file pnslog in the log subdirectory of your server installation directory.

Error Log Path

The RealAudio Server will log client identification and information about errors which occur during the operation of your server to the PN Error Log specified by the error log path. Enter a line using the following format into pnserver.conf:

ErrorLogPath   <errorpath>

It is suggested that this path point to the file pnerrlog in the log subdirectory of your server installation directory.

User and Group ID (UNIX Only)

As stated above, in order to allocate additional system resources for delivering a large number of RealAudio streams, the Server must be started under the superuser account. Once the program has started, however, and these resources have been allocated, the Server is free to change its identity to a less privileged user and group id.

Use the following format to indicate the names of the user and group names which you wish the Server to assume once it has started:

User   <UserName>

Group   <GroupName>

For example:

User   fred

Group   people

Process ID Log (UNIX Only)

For your convenience in reinitializing the Server on UNIX, it records its process in a file, if required. You can use the following format to specify the filename: the pnserver.conf file:

PidPath   <pid file>

It is suggested that this path point to a file in same directory as your log files.

Configuring Web Servers for Use with RealAudio

Before the Web server will handle RealAudio metafiles properly, you must configure it to recognize them as the following MIME type:

audio/x-pn-realaudio

This MIME type is communicated in the HTML header sent to the user's Web browser. It tells the Web browser to activate the RealAudio Player on their computer. If you do not configure the MIME type correctly, the user's Web browser will try to download the RealAudio file rather than activating the RealAudio Player.

The procedure for creating this association varies from one Web server to another. The following list gives information on MIME type additions for some of the most common Web servers in use today. If you are in doubt, or

_____
Metafiles are text files that refer the RealAudio Player to the RealAudio file. They are described in Chapter in the section titled Creating Metafiles (files with a .ram extension).

Note that both the / and \ characters are accepted on Windows NT as a field separator. Only / can be used on IX.

your Web server is not on our list, please consult your Web server documentation or the online documentation at the Progressive Networks Web site at http://www.realaudio.com/.

Webster and Mac HTTPD

Open the Admin program for the Webster server and pull down the Configure menu and select Suffix Mapping. When the Suffix Mapping dialog window opens, enter the MIME type information into its associated fields exactly as shown in the following example (these fields are case sensitive):

```
Action:       TEXT
File Suffix:  .ram
File Type:    PNRM
MIME Type:    audio/x-pn-realaudio
Creator:      PNst
```

Select the Add button to update the MIME types directory. Reinitialize the Server.

Netscape Netsite Server

Add the following to the "MIME.types" file

```
type=audio/x-pn-realaudio   exts=ra,.ram
```

Add the following line to the Server's main configuration file (called "magnus.conf" in the examples given in the Netsite documentation)

```
Init fn=load-types mime-types=mime.types
```

and then reinitialize the Web server.

Windows NT (EMWAC HTTPS 0.96)

In the HTTP server applet in the Control Panel, click on the button along the right hand side of the window marked "New mapping."

A dialog window will display existing MIME type mappings, along with a "Filename extension" text entry box along the top. Type the filename extension ".RAM" into the extension field, and then enter the full MIME type

```
audio/x-pn-realaudio
```

into the text entry field just below the words "MIME type:" and above the scrollable list of existing MIME types. Finally, select OK to add the new MIME type to the main list. You will then need to reinitialize the Web server for the changes to take effect.

NCSA HTTPD (v. 1.3 and 1.4)

For NCSA, two approaches are possible.

1. Edit the file "MIME.types" in the SERVER_ROOT/conf subdirectory
   Add the following line:

   ```
   audio/x-pn-realaudio       ram
   ```

2. Edit the file "srm.conf" in the SERVER_ROOT/conf subdirectory
   Add the following line:

   ```
   AddType audio/x-pn-realaudio    ram
   ```

Either approach will work, but the "MIME.types" file can many installations often left as distributed by NCSA, and local configuration is done by editing the srm.conf file. Once the MIME type is added using either approach (but not both), reinitialize the Web server.

CERN HTTPD (v.3.0)

Add the following lines to the "httpd.conf" file under the Server's root directory.

```
AddType    .ram    audio/x-pn-realaudio    binary
```

and then reinitialize the Web server.

Audio Server Administrator's Guide Release 1.0

O'Reilly Website NT

To change the MIME type on the O'Reilly NT Web Server, use the admin tool on the mapping page to change the content type by giving the following command:

```
.rsm audio/x-pn-realaudio
```

Adding Links for the RealAudio Player

Once the Server is configured, you should add a link on your Web page pointing to

```
http://www.RealAudio.com/
```

so that visitors to your site can obtain the RealAudio Player.

nning the Server

Once it has been installed and configured, the RealAudio Server should be started and tested. For testing, the Server should be started manually from the command line. When it has been confirmed that it works correctly, the system can be configured to start the RealAudio Server automatically every time the system is booted.

Starting the Server Manually

To start the Server manually from the command line, proceed as follows:

For Windows NT:

In the command prompt window, type:

```
bin\pnserver20 <configfile>
```

For example:

```
bin\pnserver20 pnserver.conf
```

If everything is successful this message:

```
RealAudio Server, Version 1.00(c) 1994, 1995
Progressive Networks Inc.
All Rights Reserved
```

will appear.

For UNIX:

Since the RealAudio Server runs on a high-numbered, unprivileged port, it is no necessary to start the Server as the super-user (root). However, super-user privileges are necessary when the Server needs to configure itself to use additional system resources, as it would when there are a large number of concurrent connections (See User and Group ID). If the Server is started as super-user (or it will change its user id once the resource limits are obtained, and will resume t user and group control into the configuration file.

You can start the Server by changing directories into the top level directory of t server distribution and typing:

```
bin\pnserver <configfile>
```

For example:

```
bin\pnserver pnserver.conf
```

Note that the Server will "detach" from the shell and run in the background and t daemon process; the prompt will return immediately. If everything is successful the message:

```
RealAudio Server, Version 1.00(c) 1994, 1995
Progressive Networks Inc.
All Rights Reserved
```

will appear.

If your Server does not start, review the error messages in the error log (for use Windows NT, the PN Server Log as described in Appendix B, Server Log For

Troubleshooting the RealAudio Server

If you are experiencing problems with the RealAudio Server, you will need to use the RealAudio Player to test links on your site to isolate the source of the problem. Before you try to connect to your site, launch the RA Server Setup Application to see if the Server already has the maximum number of connections, and to ensure that the maximum number of connections have not been made. If a client appears to stay connected after the audio clip should be finished, a connection may be hung (this may happen when a client's system has crashed). If you suspect that there is an inactive connection to your serve click on the inactive connection in the display window, and click the disconnect button at the bottom of the window.

Some problems will generate the following error message.

If the Server IP address has been typed incorrectly or is non-existent, you will receive an Invalid file message from the Player.

Figure 2-3. URL Error Message Box.

If the Server IP address is wrong or non-existent, you will also see the following error message from the Player:

WARNING: ...
RealAudio ...

Testing the Server

Once the Server is successfully started, you can test it by attempting to play the clips provided in the Summary section. To play the clips, start the RealAudio Player on a Windows or Macintosh computer.
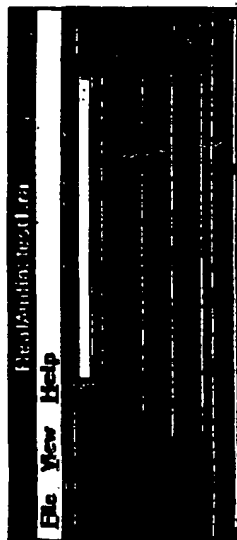
Figure 2-1. RealAudio Player.

Use the Open Location dialog, on the File menu to enter the URL of the test file sound1.ra.
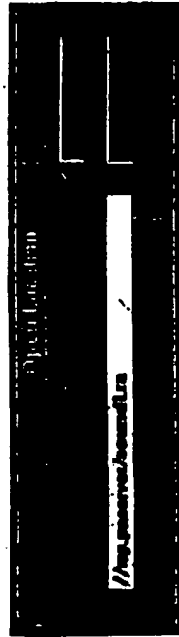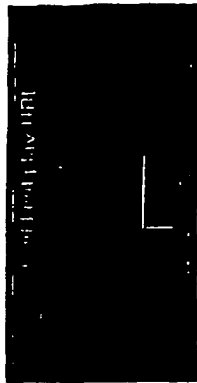

Figure 2-2. Open Location Dialog Box.

The file sound1.ra should play correctly.

Server disconnected. Player cannot receive UDP packets on port 7070. If the Player is behind a firewall, or if the connection to the Internet is through The Internet Access (TIA), it will prevent the Player from receiving audio packets sent by the Server. Firewalls must be configured to allow RealAudio to play through them. (see Appendix C, Firewall details).

Insufficient information to specify the target document. When you use the Player File menu option to request a file, an incorrect URL design will return this error.

If the problem persists, you should check the following:

Is the Server running on the host machine?

Use ps (on UNIX), or pview (on Windows NT) to check this. If the Server not running, repeat the procedure for manually starting the server, as described above.

Is the IP address of the host machine correctly configured in the net routines?

If the Player cannot access the Server over the network, then you cannot expect audio to play. Configuring IP address and routes is complex; is Contact a networking specialist for help on this.

Is the machine you are using to test this audio connected to the network used by the Server host computer?

You must have a network connection between Player and Server for and play. Contact a networking specialist for help.

Is there a firewall between the Player and the Server?

Firewalls need to be configured to allow RealAudio to play through them (see Appendix C, Firewalls for details).

Can you connect to the Server with the RealAudio Monitor?

The Monitor application will help you to diagnose the problem by which communications between the Player computer and the Server and allow you to view the running state of the connection during attempts to play the audio.
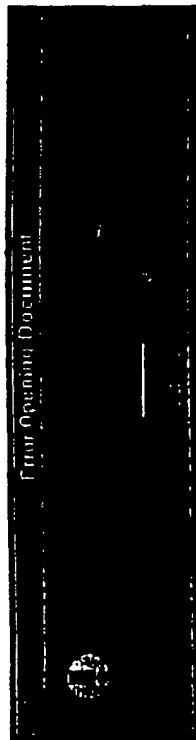

Error Opening Document

Figure 2-4. Error Opening Document Message Box.

Correct the IP address and try again.

If the Player IP address is valid, but the filename portion of the URL is invalid, then you will see the following error message. Check the filename and try again.
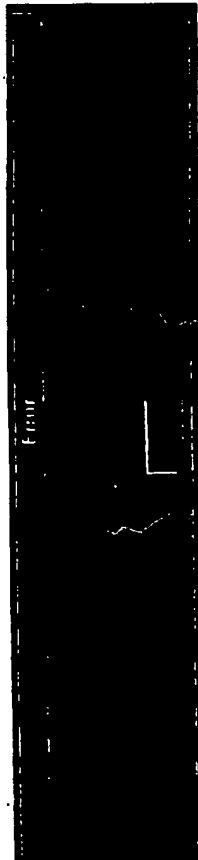

Figure 2-5. Error Message Box.

Additionally, there are several error messages generated by the RealAudio Player that may be received while testing the Server.

No document by that name available at the requested location. If the Player is unable to locate the document, it may indicate that the URL address referenced in the .ram file is incorrect.

Document is empty. If the document does not download correctly, you may see this message. Try clicking on the file again. If there are still problems, the audio file may not have encoded properly. You may need to encode it again.

Server disconnected. The server is probably too busy at this time. You will need to make a connection later. Use the Monitor to check activity on your Server before attempting a new connection.

Is there unreadable text displaying on the screen instead of audio?

You have not configured your Web server to recognize RealAudio MIME type. Refer to the section *Configuring Web Servers for Use with RealAudio*.

The Server log also records errors made by the RealAudio Server. For instructions about how to open and interpret the Server log, see Appendix B, *RealAudio Server Log Formats*.

If you still have problems after considering these possibilities, please call Progressive Networks Technical Support.

Launching the Server Automatically

Once the Server has been installed satisfactorily you should configure it to start automatically each time the system is rebooted.

The methods for doing this differ between Windows NT and UNIX.

For Windows NT:

The RealAudio Server is installed as a "Service" under Windows NT. This means that it can be controlled from the "Services Control Panel" and will start and stop automatically when the system is booted or terminated.

To install the RealAudio Server as a Service, you must logged on as a user with Administrative privileges. To install the RealAudio Server, execute the program isra.exe provided with the RealAudio Server distribution, as follows:

isra <pnserver.exe path> <config file path>

You should receive the response

RealAudio Service Installed Successfully.

Entries have now been placed in the system registry for use by the Service Manager. If at a later date you wish to remove the RealAudio Service use the command:

isra /d

You should receive the response

RealAudio Service Removed Successfully.

If you have changed the path for the Server success or configuration files, can run isra.exe again with the new paramsam.

To start and configure the RealAudio Service, use the NT Service Control Panel.

Service	Status	Startup
OLE	Started	Manual
Remote Procedure Call (RPC) Locator	Started	Automatic
Remote Procedure Call (RPC) Service		Manual
Schedule		Manual
Server	Started	Automatic
SNMP Service	Started	Automatic
Spooler	Started	Automatic
SQLMonitor		Manual

Startup Parameters:

Figure 2-6. The Windows NT Services Control Panel

Within the Services Control Panel, select the RealAudio Service. You can start, pause, continue, and stop the service, using the button on the right.

The "Startup" button takes you to the following dialog box, which is used t configure the Server startup parameters. For automatic operation, the settir should be as shown in Figure 2-7. The Startup Type is set to Automatic an Service is set to run with System Privileges.

Figure 2-7. Service Startup Dialog Box.

For Windows NT:

The Windows NT RealAudio Server can be forced to re-examine its configuration using the Services Control Panel. By Pausing and then Continuing the service from the Control Panel, the Server is instructed to reload its configuration file. Use the buttons on the right side of the Service Control Panel, with the "RealAudio Service" selected, to do this (see Figure 2-6).

For UNIX:

You will need the process id of the Server. If you do not know it, check the pid file or run ps to obtain the process id. The exact parameters for ps depend upon the version of UNIX you are using.

On BSDI, LINUX, SUNOS, use:

    ps -aux

On SOLARIS and IRIX, use:

    ps -ef

After making the desired changes to the configuration file, deliver a HUP signal to the Server to force it to re-examine its configuration.

    kill -HUP <processId>

Stopping the Server

For Windows NT:

Open the Services Control Panel and locate the RealAudio Server. You can use the Stop button on the right side of the control panel to terminate the Server (see Figure 2-6).

For UNIX:

It is suggested that a command to start the Server be added to the boot-time scripts of your UNIX system by your system administrator. (The boot-time scripts generally reside in files or directories beneath the /etc subdirectory.)

Changing the Configuration of a Running Server

The Server can be forced to reload and change its configuration without stopping. For example, you may wish to authorize an additional monitor connection (see *Maximum Monitor Connections*) or fewer audio connections (see *Maximum Audio Connections*).

---

no connection above an OS-dependent threshold without shutting down and restarting the server. This is because the server cannot regain root privileges once it has changed its user ID.

Keep in mind that if you launch the server as super-user but instruct it to change to another user ID after startup (see *User ID* in *Setting Configuration Parameters*, above), you may not be able to raise the maximum number of

For UNIX:

Once you have obtained the process id (see the previous section), use the following procedure, while logged on with the same user id as the Server (or as super-user):

    kill <processid>

To verify that the Server is stopped, use the appropriate ps command for your system.

RealAudio Server Monitor

To track a running server from a remote location, you can use the RealAudio Server Monitor application. This application, which currently runs on Windows NT, Windows 3.1, and Windows 95, can be found in the bin subdirectory of the Server installation. If you have the UNIX distribution, download the monitor.exe file to your Windows system using ftp (be certain to set your ftp client to binary mode).

To launch the monitor, use the file manager to locate the monitor.exe file and double-click to start the program.

Use the New option on the File menu to create a connection to a server. Enter the host name, port number and monitor password (see *Monitor Password*) of your server. For example:
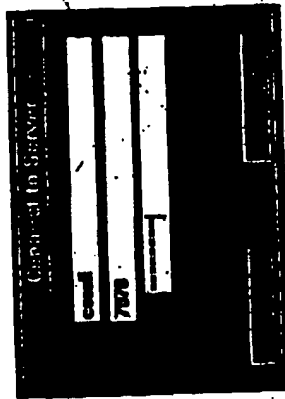
Figure 2-8. Server Connection Dialog Box.

You can save your configuration using the Save As... option on the File menu. This feature can be used to create a program item to automatically launch a monitor for your specific server, perhaps from your Windows Startup program group.

Interpreting the Monitor Display

Once you connect to your server, the Monitor will display a graph indicating the number of clients accessing the Server for the past hour. The scrollbar can be used to navigate through the entire hour's data, however only 5 minutes worth of data is shown at a time. An example Monitor display is shown in Figure 2-9.

Figure 2-9. Monitor Display

The lines on the display are color coded to represent the following information:

White: All connections

Blue: Normal audio connections

Green: RealAudio monitor connections

Red: New connection: function being negotiated

The peak number of connections made since the Server was started is displayed in the box in the upper left corner of the graph screen. The next box shows the length of time the Server has been running in days, hours, minutes, seconds, and tenths of seconds. The current number of connections is shown in the box on the right corner.

Under the Window pulldown menu are options to view the Client window, which shows the network hostname or address of connected clients, and the Log window, which depicts connection information similar to that contained in the FN Server Log (e.g., the name of the document requested by the client).

The Client Window, shown in Figure 2-10, provides a list of all current Monitor and Player connections to the Server, complete with IP address and type of activity.

Figure 2-10. Monitor Client Window

etwork Performance Issues

The Internet is not a perfect medium: there are a number of factors that can interfere with the quality of the audio being delivered to your users. Audio packets can be lost during delivery through the Internet if they hit slow routers, or if the network is especially busy. Recurrent problems may indicate that y need to modify your connection to your Internet service provider.

To monitor audio quality, you should occasionally use the RealAudio Player make an Internet connection to the links on your Web page. Do not use the Open File option from the RealAudio Player if you wish to check the Internet connections, because that connection operates over the LAN. When the connection is made, open the Statistics window for the RealAudio Player to monitor the percentage of packet loss that is occurring. If the audio quality poor, odds are that your users will be experiencing the issue.

If you determine that there is a high packet loss level, your first step will be to consult your Internet provider. You may need a faster Internet connection, or there may be other problems with your Internet service.

Since RealAudio files use 10 k band/second while downloading, you should check the configuration file for the number of connections to ensure that yo Internet connection can handle the peak throughput (see Maximum Audio Connections).

Chapter 3

Producing RealAudio Content

Now that your server has been installed and tested, you are ready to produce RealAudio files for your Web site. The Encoder compresses files in .au, .wav, and raw pcm sample formats into the RealAudio format. The resulting RealAudio file can then be attached to World Wide Web pages where it is seen by user-friendly graphical form.

You will need to record and pre-process audio clips with software designed for that purpose. Once recorded, audio files can be encoded into the RealAudio format (files shown with an .ra extension) using one of the Encoder products:

- The RealAudio Encoder for Windows and Macintosh is a user-friendly utility with a graphical interface available for Windows (in 16- and 32-bit versions) and for the Macintosh (either 68K or PowerPC).

- The RealAudio Command Line Encoder is intended for batch-mode applications and other applications where the Encoder will be placed in a script or batch file. Versions exist for all supported UNIX platforms, and for use in the Windows NT command window.

The command line Encoder appropriate for your server platform comes packaged with the server distribution. Encoder versions for Windows and Macintosh can be downloaded free of charge from our World Wide Web site.

Recording Audio Files

The RealAudio Encoder puts sound files through advanced compression while preparing them for use with the RealAudio Server, resulting in a loss of some sound information. To compensate for this, you must start with a quality recording; satellite signals, Digital Audio Tapes (DAT) or Compact Discs (CD's), for example, will result in much higher quality RealAudio files. You will have

better results if you use simpler audio signals rather than very complex signals such as background music playing simultaneously with voices.

Pre-processing the sound file before encoding also contributes to higher quality sound. For an in-depth explanation about pre-processing audio, see "Getting the Best Sound out of RealAudio" on the Progressive Networks Web site at:

    http://www.realaudio.com/tech_notes/audiohints.html

Information on this page will be expanded as our research progresses.

There are a number of shareware software packages available for recording sound, such as CoolEdit for Windows, available at

    http://www.ep.se/cool/

or you can search the Yahoo directory at:

    http://www.yahoo.com/Computers/Music/Software/

to find recording software for other platforms.

The audio file used for input to the RealAudio Encoder should use the full range of available amplitude, without exceeding the maximum input level. "Clipping" results if this level is exceeded, and it is heard as a pop or click in the recording file. When encoded, a RealAudio file with clipping will have high-frequency background noise or static.

If the full amplitude range is not used, the RealAudio files will sound muffled. To offset for this, use the audio editor's "Increase Amplitude" or "Increase Volume" command to adjust the range before encoding the file. Some audio editors have a "Normalize" function that will maximize levels automatically.

Keep in mind that the audio files take up a lot of disk space before they are encoded. You can use Table 3-1 to calculate how much space you will need for your recording. Once the files are encoded into the RealAudio format, they will use 60 times less (1.6 MB/hour) of disk space, a significant savings over other audio formats.

Before converting a sound file to the RealAudio format, the Encoder needs information about the sampling rate used to digitize the audio into a file. Since the file header does not contain this information, it must be attached to the file via the file extension. You may need to rename the file, using the appropriate file extension, to help the Encoder to identify your file. You can refer to Table 3-1 for file conversion information.

NOTE: For audio data compressed, the audio header which does not contain the information about the file. The file extension is used for providing this information.

Table 3-1. Audio Files Reference Table

File Type	Extension	Disk Space Required for each Minute Audio Play Time
All Windows .WAV files	.WAV	662 KB @ 11kHz ; 1,322 KB @ 22kHz
Sun 8-kHz .AU files (u-law)	.AU	480 KB
Sun 11-kHz .AU files (u-law)	.A11	660 KB
Sun 22-kHz .AU files (u-law)	.A22	1.32 MB
Sun 44-kHz .AU files (u-law)	.A44	2.64 MB
PCM (raw 16-bit) 8-kHz data	.PCM	960 KB
PCM (raw 16-bit) 11-kHz data	.P11	1.32 MB
PCM (raw 16-bit) 22-kHz data	.P22	2.64 MB
PCM (raw 16-bit) 44-kHz data	.P44	5.23 MB

The RealAudio Command Line Encoder

Many audio packages for Windows, such as the shareware program CoolEdit, can be used to convert files from other formats not already supported by the Encoder.

The command-line Encoder is intended for batch-mode operation.

It is located in the bin subdirectory of the main server directory, under the same console for the UNIX system, and encodes for all other systems. The command the Encoder takes two arguments: the name of the input file, and, optionally, the name of the output file.

name of a description file that identifies the title, author, and copyright of the sound file, as follows:

```
encoder  <rawaudiofile> <descriptionfile>
```

The <rawaudiofile> is the input data in one of the given in Table 5-1. The <descriptionfile> is a file containing lines providing compiletions which are associated with the audio stream. Currently the file should contain three lines, specifying the Title, Author and Copyright strings for the clip. These appear in the Player Window, when the clip is played.

For example, you might place the following data in your <descriptionfile>:

```
ABC News 3 PM 13 July 1995 Pacific Time
ABC News and Information Network
1995
```

which would cause the Player to appear then, when playing the clip:

Figure 5-1. RealAudio file information displayed by RealAudio Player.

When the Encoder finishes, it places the compressed audio data in a RealAudio file with the same name as the raw audio file, but with the extension .ra. This file, when copied into the RealAudio Server directory tree, is ready for delivery by users of the RealAudio Player.

Editing RealAudio Files

RealAudio files may be edited to change the title attached to the sound clip, to cut clips, or to paste clips together. If, for example, you wanted to attach a music header

to an interview, you could paste the music into the interview file. Command-line tools for cutting, recut, and repasting are provided in the bin directory for each server platform.

Editing Titles on RealAudio Files

To change the title, author, and copyright information encoded with a RealAudio file, you use the ratitle command in the following format:

```
ratitle  <oldfile.ra>  <newfile.ra>  <titlefile>
```

You will need to create the <titlefile> before you use the ratitle command. The <titlefile> is simply a description file that contains three lines with the title of the audio clip on the first, the author on the second, and the copyright a third (see above). This information will be displayed when the listener plays the audio file.

Note that the old and new filenames cannot be the same.

Cutting RealAudio Files

Use the racut command when you only want a portion of the RealAudio file to play. The racut command uses the following format:

```
racut  <oldfile.ra>  <newfile.ra>  <starttime>  <endtime>
```

where starttime and endtime are consist of days, hours, minutes and seconds separated by colons, followed by a decimal point, followed by tenths of seconds. Of course, some of the time increments are optional; you will probably never want to indicate days. An example:

```
racut  old.ra  new.ra  5:00.5  5:17
```

when the <newfile.ra> contains the segment from the five-minute, five-tenths-of-a-second mark through the five-minute, thirty-seven-seconds mark of the <oldfile.ra>.

If you are unsure of when the audio portion you want to cut begins and ends, you can play the audio file through the RealAudio Player, and note the begin and ends times as they are displayed.

The old and new filenames cannot be the same at this time.

Pasting RealAudio Files

You will use the repaste command to combine a series of RealAudio files into one file. Use the the following format:

```
repaste <file1.ra> <file2.ra> <file3.ra> <newfile.ra>
```

If n files are specified, the first n-1 files will be concatenated together and output to the last file.

(RealAudio files cannot simply be concatenated using normal operating system commands. You must always use the repaste command to combine files.)

Creating RealAudio Links in Web Pages

If you have created HTML documents in the past, you know that links to other Web pages are shown in the HTML document as the URL address of the document you wish to access. Since RealAudio files are unknown to the RealAudio Server and can only be retrieved by the RealAudio Player, a few extra steps must be taken to complete the network path that links to the audio file. It may be helpful if you imagine the Web page as a sheet of paper with directions to someone's home written on it. For most Web documents, you would follow the directions and arrive at the home you are looking for. For RealAudio files, the Web page is like a sheet of paper that gives you directions to a house, and once you arrive at the house, there is another piece of paper stacked to the door with a set of directions to another home, which is your actual destination. The first sheet of paper represents the metafile, represented by a new extension, and the sheet of paper at the door represents the RealAudio file, represented by an .ra extension. Instead of pointing to the audio file, your HTML document will point to the metafile. Unlike the .ra file, the metafile does not display information through the browser, but rather, it provides the audio file's location on the RealAudio Server to the RealAudio Player. The Player uses this information to locate the file on the RealAudio Server. Remember that RealAudio files cannot be retrieved directly by the Web page because this will cause them to be downloaded in their entirety before playback. In order for the audio files to be played in real time, they must be played through a RealAudio Player, and served by a RealAudio Server.

Metafiles are text files, with the extension .ram, which contain lines of the form:

```
pnm://hostname/path
```

For example:

```
pnm://www.realaudio.com/hello1.ra
```

might be the the contents of this metafile:

```
hello1.ram
```

To insert a reference to this .ram file in your HTML, simply reference the .ram file in a hyperlink, for example:

```
<A HREF="http://www.realaudio.com/hello1.ram">Hello
```

and then make sure your World Wide Web server is properly configured to understand that the extension .ram refers to the MIME type x-pn-realaudio (detailed instructions for a variety of Web server software are available in t section Configuring Web Servers for Use with RealAudio).

You can create metafiles that contain several URLs as separate lines (with blank lines); the Player will play these documents in sequence.

In addition, a beginning point in time other than the start of the document is specified by appending the time to the URL, for example:

```
pnm://www.realaudio.com/hello1.ra$0:30
```

This URL specifies the same audio document as before, but beginning from second mark. The dollar sign signifies that the the remainder of the URL speci position in time. Tenths of seconds, seconds, minutes, hours, and days may specified (tenths of seconds are separated from seconds by a decimal point, all other values are always separated by colons). The standard form is:

```
&dd:hh:mm:ss.ss
```

The time will be interpreted from right to left, so it is not necessary to put a into every blank field, unless you are missing an increment between two of the increments. For example, if you wished to show hours and seconds, but no minutes, you would need to put a zero into the minutes space so that the time is interpreted correctly.

Appendix A

Server Configuration Table

```
For all Systems:

PsaPort          <portNumber> (default 7070) .
AudioConnections <MaxAudioConnections>
Timeout          <Seconds> (default 300 seconds)
MonitorConnections <MaximumMonitorConnections>
MonitorPassword  <passwordOfYourChoice>
BasePath         <basepath>
LogPath          <logpath>
ErrorLogPath     <errorpath>

For UNIX only:

User             <UserName>
Group            <GroupName>
PidPath          <pid file>
```

Appendix B

RealAudio Server Log Formats

RealAudio Server Log

The RealAudio Server Log uses the common log file format used by most Web servers to record transactions by clients using the RealAudio Server. Each transaction is recorded on one line in fields specified by white space. To view the Server open the file specified by the name used in your Logfile Path using Notepad, Microsoft Word or some other text editor.

Since new information is appended to the log each time a new connection is completed or attempted, it is possible that the log will grow quickly. When the log becomes lengthy, you can delete it and a new log will be generated the next time that a connection is made to the RealAudio Server.

The purpose of the Server log is to help you monitor and manage your RealAudio Server. You can view how many clients have connected to your server, the names of their machines, the clips they listened to, the times of day they connected, and also that were generated by the RealAudio Server. This information can give you an idea who your audience is and what clips are popular. By monitoring the log for errors you can troubleshoot and correct possible problems on your site.

An example of a log entry might be as follows:

```
hamming.prognet.com - - [21/Dec/1995:13:44:32 -0801
\"GET /html/pumedio/core_pia.ra PNA/4" 200 0 \
[PNPLAYER 101 ALPHA] [STAT1,50 3 2 0 0]
```

The following information is represented in each field.

1. Client IP Address or Hostname, e.g.:

   hamming.prognet.com

2. **Time information.** This records the time that the client made access. The format used is as follows:

   `[day/mon/year:hh:mm:ss YZ (vs GMT)]`

   For example:

   `[21/Feb/1995:13:44:32 -0800]`

3. **Document requested by client.** Information will appear in the following format:

   `GET <filename>`

   For example:

   `GET /html/rpaudio/grace_sta.ra`

4. **Protocol version** used by the client to obtain information from the Server and as identifier for the client's protocol. The first part should read "PNA" to reflect the RealAudio Server protocol. The protocol information will appear as follows:

   `PNA-<X>`

   where <X> is the protocol number (currently 4 or 5).

5. **Return code** (using HTTP standard error codes). By convention, World Wide Web servers use return code 200 to indicate that document transfer occurred with no errors or problems. The RealAudio Server follows this format. Generally, all codes in the access log should indicate a return code of 200.

6. **Number of bytes** transferred during playback. This field will often be lower than the total size of the RealAudio file, indicating partial playback of the file. If, however, this field is consistently low for some or all audio files, this may indicate that RealAudio Players are able to connect to your server, but are unable to play files. You may need to check your system error logs in such a situation for messages relating to network system errors.

7. **Client Player Id string.** This field is not part of the standard format. The Id string is text sent by the client that describes the version and type of RealAudio Player being used to access audio files.

   For example:

`[PNPLAYER 101 ALPHA]`

8. **Connection Statistics.** When a Player completes playing a clip it can provide connection information to the Server. This information can be valuable for diagnostic purposes, especially if your clients are reporting difficulties with playback and you suspect network access problems. Client statistics are reported in the following format:

   `[STAT1.50 3 2 0 0]`

   The fields contain the following information:

   Keyword. At this time the keyword is always STAT1, but additional keywords may be used in the future.

   Total packets. This number indicates the total number of packets received by the client.

   Out-of-order packets. This is the most common problem reported on the PN Server Log. If the percentage of missing packets is low, then it will not have a serious effect on quality, but if it is high, then the audio will be seriously degraded. See *Network Performance Issues* in Chapter 2 for more information.

   Missing packets. This does not necessarily degrade the quality of the audio. The packets are monitored as they are being played by the client.

   Early packets. If the client receives packets too early, then older packets will be discarded. This problem is very rare, and it may indicate that the client's machine is running too slow, or has a bad Internet connection. However, if this problem shows up very often, you may need to investigate further.

   Late packets. If the client receives packets too late, the Player will have either passed that portion of the audio. This is also very rare occurrence, and if it happens often, your Internet connection may not be fast enough.

The PN Error Log

The PN Error Log records errors made by the Server. The following errors are written to this log:

configuration file.) The Server uses this port to listen for incoming connection requests. The Server will be unable to bind to this port in stopped circumstances. First, another copy of the RealAudio server may already be listening to this port. You can check for this condition using the ps command and looking in the process list for other copies of the progserve application. Second, if you have specified that the Server listen on a TCP port numbered less than 1024, you will have to run the Server as super-user, since only the super-user can bind to "privileged ports" below 1024. (UNIX system only.)

Out of Memory

The "Out of Memory" error message is given if the Server is unable to dynamically allocate enough memory to create a new connection or manage existing connection. If you receive an Out of Memory message, you may require additional memory or you may need to swap space for your server machine to use for dynamic memory allocation.

Document not Found

This error message indicates that the user tried to access a document and the document could not be found. It may be that the user tried to use the wrong URL and the Server failed the request back. However, if you see this mean than once for the one document, you should check your meanfile to ensure that the path pointing to the document is accurate.

SIGPIPE Signal Received (UNIX systems only)

The SIGPIPE signal is sent to the Server by the operating system when the client sharply cuts the connection. No action is required for this error, it is simply an informational message.

Exiting on KILL Signal (UNIX systems only)

This message is sent to the error logs when the Server is stopped by the system administrator using the kill command sequence outlined in chapter 2. No action is required since this message simply records the time at which the Server was stopped.

Accept Failed

If a new client tries to connect to the Server and is rejected, then this error will show up in the log. The UNIX implementation of TCP/IP has a small pending connection queue which can easily be filled at peak usage periods. This error will often show up both in the RealAudio Server error log and in your World Wide Web server logs, indicating that more truly simultaneous requests for documents occurred than the operating system would allow. If this error occurs frequently, you may need to contact your service representative at Progressive Networks to discuss potential solutions. For more information about the conditions under which this error occurs, consult a standard reference on the UNIX implementation of TCP/IP (see bibliography for suggested references).

Unable to bind listener socket to port

When starting the RealAudio server, the software attempts to bind itself to the port listed in the configuration file (or to TCP port 7070 if none is listed in the

Appendix C

Firewalls

Use of the RealAudio Server or Player from behind a security firewall is a difficult issue requiring careful consideration of the risks and benefits. If possible, the safest way to use the RealAudio Server is from a dedicated host or host located outside your protected network.

If, however, your server is behind a firewall and you wish to permit outside hosts to connect your server, and if your firewall is of the packet filtering variety, you will need to permit incoming connections on TCP port 7070. You will also need to permit outgoing UDP packets on all ports between 6970 and 7170. These requirements are similar to those for a ftp server.

If your firewall is not a simple packet filter and requires the use of application-level gateways or "proxy" servers, we are working with firewall vendors to incorporate support for RealAudio into their products. Connect Progressive Networks for a list of firewall programs currently supported.

For more information on network firewalls and their configuration, the following sources are available on the Internet:

Firewalls mailing list archives	ftp.greatcircle.com	directory: /pub/firewalls
Internet firewall toolkit	ftp.tis.com	directory: /pub/firewalls
Papers and documentation	ftp.comst.purdue.edu	
Cisco router configuration	ftp.cisco.com	directory: /pub/incl-examples.tar.Z

Appendix D

Bibliography

To read more about:

Transmission Control Protocol

TCP/IP Illustrated, Volume 1, The Protocols, by W. Richard Stevens.

TCP/IP Illustrated, Volume 2, The Implementation by Gary R. Wright and W. Richard Stevens.

Firewalls

Firewalls and Internet Security: Repelling the Wily Hacker, by William R. Cheswick and Steven M. Bellovin, 1994, Addison-Wesley.

Internet Firewalls and Network Security, by Karanjit Siyan and Chris Hare, 1995, New Riders Publishing.

Appendix E

RealAudio Server Setup Checklist

To ensure complete installation of the RealAudio Server, use the following checklist:

√	Action Needed:
	Configure the RealAudio Server using the RA Server Setup Application.
	Install the RealAudio Encoder and use it to encode audio files into the RealAudio format (with an .ra extension).
	Save RealAudio files to a directory below the RealAudio Server directory.
	Create metafiles (with a .ram extension).
	Write links to metafiles in the Web page (HTML document).
	Configure the Web Server to recognize RealAudio MIME types.
	Start the RealAudio Server.
	Use the RealAudio Player to test your site.

Index
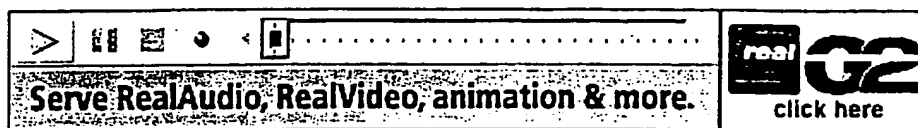
Microsoft, Spry and Spyglass to Include RealAudio

Progressive Networks Internet RealAudio Player to be distributed with leading commercial web browsers

HotWired, Hollywood Online, Metaverse, GNN and RadioNet/Human Factor Websites to offer RealAudio-based programming

SEATTLE--(BUSINESS WIRE)--April 12, 1995--Progressive Networks (PN) Wednesday announced agreements with leading web browser software publishers and website content providers to support the RealAudio Player Internet audio-on-demand delivery system.

The RealAudio player will be distributed with web browsers provided by Microsoft, Spry and Spyglass. Five leading-edge website providers, HotWired, Hollywood Online, Metaverse, GNN and RadioNet/Human Factor, have announced that they are implementing the RealAudio Server on their site and have plans to include RealAudio- based content as a key part of their website.

RealAudio is a client-server software system that enables Internet and on-line users equipped with conventional multimedia personal computers and voice-grade telephone lines to browse, select and play back audio or audio-based multimedia content on demand, in real time, as easily as using a standard video cassette player/ recorder.

This is a breakthrough, compared with the delivery of audio over conventional on-line methods in which audio is downloaded at a rate that is five to ten times longer than the actual program -- e.g., the listener must wait 25 minutes longer before listening to just five minutes of audio.

"We think Progressive Networks' RealAudio technology is a great step forward for the Internet," said John Ludwig, general manager, Personal Systems Division, Microsoft. "Microsoft plans to include RealAudio Player with our future Internet-related products."

"Real-time audio changes the whole paradigm of multimedia on the web," said Andy Parker, director of business development, Spyglass Inc. "This new technology will deliver multimedia to the masses, and we're excited to include the RealAudio Player with Enhanced Mosaic."

"I have always believed that adding real-time audio to the Internet is a service our customers would be enthusiastic about, and Progressive Networks' RealAudio product is way ahead of everybody in providing that service," said Dave Pool, executive vice president of Compuserve's Internet Division and founder and former president of Spry Inc. "That is why we are incorporating RealAudio into Internet-in-a-box."

In addition, PN is working with independent content publishers interested in using RealAudio to enhance their own websites.

"We think RealAudio gives us an incredible opportunity to enrich our entertainment and news areas," said Chip Bayers, managing editor, HotWired. "HotWired is about the arts and culture of the 21st century, and certainly, the oral arts are an area we want to explore. RealAudio gives us that opportunity."

"Hollywood Online is excited to be using RealAudio programming to provide celebrity interviews and entertainment-related soundbites to our customers," said Stuart Halperin, executive vice president of marketing, Hollywood Online Inc.

"We are excited to offer RealAudio programming that our customers can instantly access," said Adam Curry, president, Metaverse. "This will greatly expand our audio programming opportunities for an even richer Internet experience."

One of the programs that Metaverse will make available on its On Ramp website is Up Close, a music/interview program featuring BMI songwriters and composers.

Programming is also now available on the RealAudio website, including clips from ABC Voice of America, ABC Radio Yesteryear, National Public Radio and other entertainment and music programs.

About Progressive Networks

Progressive Networks, based in Seattle, develops and markets software products and services designed to enable users of personal computers and other digital devices to send and receive audio and audio-based multimedia services using the existing infrastructure.

Legal Notice/Terms of Use

Progressive Networks Ships RealAudio System

CBS, MCI, Starwave, Dow Jones, Time Life, Inc., Asia On-Line and University of Hawaii Adopt RealAudio Technology

SEATTLE, July 25, 1995 - Progressive Networks (PN), an interactive communications company focused on the delivery of real-time audio on demand over the Internet, announced today that CBS, MCI, Starwave, Nomura Research and Dow Jones and Company, Inc. are among the first companies to order its RealAudio Server, which is shipping this week. The company is also shipping final versions of RealAudio Player and RealAudio Encoder, the other two components of its Internet audio delivery system.

Since the April 10, 1995 announcement of the availability of Beta versions, nearly 200,000 RealAudio Players have been downloaded without charge from the RealAudio website (http://www.RealAudio.com). Statistics during the Beta period revealed more than 280,000 daily hits and people listening to more than 500 hours of RealAudio programming daily, making the RealAudio Beta test the largest trial of on-demand multimedia in the world.

"The enthusiastic response for RealAudio during our Beta stage, coupled with the number of major companies that pre-booked orders for the RealAudio Server indicates that RealAudio is rapidly becoming the ubiquitous method for delivering real-time audio over the Internet," said Rob Glaser, president and CEO of Progressive Networks.

Leading companies from around the world, representing strong interest from a broad range of business sectors including finance, news, entertainment and education, have placed orders for the RealAudio Server.

"Our site, 'CBS Up To The Minute News,' is value-added journalism for our television viewers as well as for people who find us on the Web," said Tom Bradford, executive producer of CBS Up To The Minute News. "The addition of RealAudio provides an even greater value-add."

"As the UH Digital Media Lab has been on the forefront of Internet technology, we're excited about the potential in distance education that RealAudio technology represents," said Craig Miller, Digital Media Lab Coordinator, University of Hawaii. "We are working to develop a multimedia resource that will allow students across the U.S. to see and hear native, less commonly taught languages of the Asia and the Pacific. RealAudio is the key enabling technology in this effort."

"With RealAudio technology, we are excited to provide worldwide real-time audio communication for the first time," said Dion Wiggins, CEO of Asia On-Line Limited, one of the first customers to receive a copy of the RealAudio Server release version. "We are pushing Asia ahead with technology and RealAudio is pushing Internet communications capabilities to a new level and we are very pleased to be part of the process."
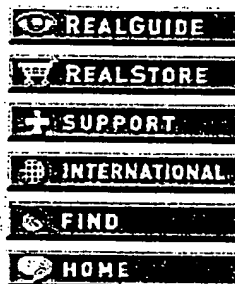
Additional companies ordering Servers include AGT/US News and World Report, Axion Internet Communications, CBC Radio, CDNOW, Cameron Audio Networks, eworks!, Hajjar/Kaufman, Hearst Magazines, NTT Advertising, NandO.net, Open University, Rockweb, Taylor Satellite Network, Telecom Finland and University of Hawaii.

Progressive Networks' RealAudio client-server software system enables Internet and on-line users equipped with conventional multimedia personal computers and voice-grade telephone lines to browse, select and play back audio or audio-based multimedia content on demand, in real time.

RealAudio Server Platforms and Upgrades

Windows NT, Solaris, SunOS, BSDI and IRIX versions of the RealAudio Server are now shipping. Additional features and improvements made during the Beta process include improved performance and smaller memory footprint enabling users to drive more streams from a server while using less memory and operating resources. Usability improvements include the addition of comprehensive documentation to support installing and using the RealAudio Server and better logging services, which allows server administrators to generate more accurate usage statistics for research and billing purposes.

RealAudio Player Platforms and Upgrades

The RealAudio Player release version, available for both Windows and Macintosh operating systems can be downloaded for free at http://www.RealAudio.com. The release version offers an improved user interface, a more robust implementation of the Player, and the ability to customize the appearance.

RealAudio Player's interface was redesigned to improve overall usability and enable volume adjustment and customized adjustments to clip length and play time. The new version also provides access to information regarding the title, author and copyright of an audio clip; and access to optional "slimmed down" versions of the player.

RealAudio Player's new features include "stop" and "play" buttons enabling users to replay the last clip heard and a loss correction capability, which compensates for audio lost in transit due to the unreliable Internet environment.

RealAudio Player also supports additional World Wide Web browsers, winsocks and networking services including AIR Mosaic (Internet In a Box), CompuServe connection using AIR Mosaic, Cello WWW Browser, EINet WinWeb, InternetMCI Navigator, Spyglass Mosaic and Enhanced Mosaic, Microsoft Internet Explorer, Booklink's InternetWorks and Quarterdeck Mosaic.

The RealAudio Player can also be used by customers of America Online (version 2.5 or later) or Netcom (version 1.60 or later) by using the Web browsers listed above. Starting August, the RealAudio Player will be included with other popular Web browsers such as Microsoft Internet Explorer.

RealAudio Studio/Encoder Platform and Upgrades

The RealAudio Encoder release version, available for Windows operating systems, is also available to download for free from http://www.RealAudio.com. The Encoder, which enables users to create RealAudio, compresses digital audio files in common formats such as Windows WAV and Macintosh AIFF and converts them to RealAudio (RA) format, which can be played with the RealAudio Player and delivered

through the Internet using the RealAudio Server. The Encoder will be a component of a future PN product, the RealAudio Studio, which will include additional content creation and editing tools.

The Encoder for Macintosh is available for Beta testing and will ship in August.

About Progressive Networks

Progressive Networks, based in Seattle, develops and markets software products and services designed to enable users of personal computers and other digital devices to send and receive audio and audio-based multimedia services using the existing infrastructure.

Legal Notice/Terms of Use